October, 2012

Every Week Counts:
Preterm Births among American Indian/Alaskan Native Montana Residents, 2008-2011

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Introduction

Preterm birth is defined as a live birth occurring before 37 completed weeks of gestation. Globally, over 1 million babies die each year from preterm birth complications. Many of the preterm infants who survive are at a higher risk for developmental problems and life-long disability such as visual and hearing impairments, and intellectual and learning disabilities. The United States is one of the top 10 countries with the highest rates of preterm birth.[1] In 2010, both the US and Montana had a preterm birth rate of 12.0% for all pregnancies.[2]

Considerable differences have been reported in preterm birth rates across racial/ethnic groups. Although exact reasons have not been identified why certain racial and ethnic groups experience higher rates of preterm birth, several explanations have been proposed, including socioeconomic conditions, maternal behaviors, stress, infections, and genetic factors.[1] In 2007, the national preterm birth rate was 13.9% for American Indian/ Alaskan Native (AI/AN) women but 11.5% for White, non-Hispanic women.[3] During 2008-2011, Montana had a significantly higher rate of singleton preterm births to AI/AN women (11.9%, (95% CI: 8.8-10.3)) compared to other women in the state (7.3%, (95% CI: 7.0-7.5)).[4] This document presents results from a study which examined the prevalence of risk factors for preterm singleton live births among AI/AN residents that occurred in Montana from 2008 through 2011.

Methods

Data Source

Data were obtained from the Montana Office of Vital Statistics, 2008-2011 birth certificates for singleton live births to AI/AN mothers residing in Montana.

Data Selection and Definitions

The National Center for Health Statistics (NCHS) primary method of calculating gestational age is the interval between the first day of the mother's last normal menstrual period (LMP) and the date of birth.[2] Some studies suggest the LMP yields higher estimates of preterm births compared to obstetric estimates of gestational age.[5,6] In our study, 14.2% of records had missing or miscoded LMP dates for the gestational age in the singleton AI/AN birth cohort, but only 0.3% had missing obstetric estimation of gestational age. We compared LMP and obstetric estimates of gestational age and found that the mean of gestational ages of 38.8 and 38.6 weeks, respectively, was not significantly different between the two groups. In this study, we used the obstetric estimate of gestation to identify the factors associated with preterm births (<37 weeks) among AI/AN women.

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[1] Howson Eds CP, Kinney MV, Lawn JE. March of Dimes, PMNCH, Save the Children, World Health Organization. Born to Soon. The Global Action Report on Preterm Birth. Geneva, 2012.
[2] Percent of U.S. Births Born Pre-Term. National Center for Health Statistics, 2010. http://www.cdc.gov/nchs/pressroom/states/PRETERM_STATE_2010.pdf
[3] Martin JA. Preterm Births-United States,2007. Centers for Disease Control and Prevention. MMWR 2011;60(Supp):78.
[4] Montana Office of Vital Statistics, 2008-2011.
[5] Arizona Department of Health Services. Preterm Birth and Low Birth Weight in Arizona, 2010.
[6] Pearl M, Wier M, Kharrazi M. Assessing the quality of last menstrual period date on California birth records. Pediatric and Perinatal Epidemiology, 2007; 21 (Supp.2),50-61.

Risk factors and demographic characteristics associated with preterm birth were identified from a literature search and extracted from the birth certificates.[4,7,8] These variables were used in the logistic regression model analysis:

- residency (metropolitan, micropolitan, rural)[9]
- marital status (married, unmarried)
- maternal age (≤ 19 years, 20-29 years, ≥ 30 years)
- education level (high school or less, more than high school)
- smoking during pregnancy (yes, no)
- chronic diabetes (yes, no)
- pregnancy-related diabetes (yes, no)
- chronic hypertension (yes, no)
- pregnancy-related hypertension (yes, no)
- previous preterm birth (yes, no)
- prenatal care (no prenatal care, any prenatal care)

We tested these factors for association with preterm birth in our cohort of AI/AN women [Table 1]. Factors that were significant in univariate comparisons by Chi Square test (X^2) were used in a logistic regression model [Table 2]. All analyzed variables were categorical. The response variable was binary (<37 weeks for preterm birth and ≥37 weeks for term birth).

Study Population

From 2008 through 2011, 5,793 singleton live births occurred to Montana resident AI/AN mothers. We excluded 113 (2.0%) records with missing gestational age data, or cases with apparent miscoding of gestational age or birth weight analysis resulting in a sample of 5,680 births.

Results

Preterm Birth and Birth Weight

Among these 5,680 singleton live births to AI/AN women, 546 (9.6%) were preterm births. The mean birth weight of preterm infants was 2.2 pounds less than full-term infants (5.4 pounds, with a standard deviation of ±1.4 and 7.6 pounds ±1.0, respectively, $p < 0.001$) and the prevalence of birth weight less than 5.5 pounds was 48.9% among preterm infants, compared to 1.6% among full-term infants ($p < 0.001$) (data not shown).

Maternal Demographics and Preterm Birth

Preterm births were more common among women age 30 years and older than among younger women [Table 1]. Marital status, education, Medicaid enrollment, and residence were not associated with differences in preterm births. Women with a previous preterm birth, lack of prenatal care, smoking during pregnancy, preexisting diabetes, and pregnancy-related hypertension (including hypertension first diagnosed in pregnancy, preeclampsia, and eclampsia) had a higher rate of preterm births than did women without these conditions.

[7] Centers for Disease Control and Prevention. PRAMS and ……The Pregnancy Risk Assessment Monitoring System. http://www.cdc.gov/reproductivehealth/ProductsPubs/PDFs/Preterm%20Delivery%20FS.pdf

[8] Hillemeier M, Weisman C, Chase G, Dyer A. Individual and Community Predictors of Preterm Birth and Low Birth weight Along the Rural-Urban Continuum in Central Pennsylvania. National Rural Health Association. Women's Health. 2007; Vol.23, No.1.

[9] Based on Montana Core Based Statistical Areas (CBSA): Metropolitan includes counties: Carbon, Cascade, Missoula, and Yellowstone. Micropolitan includes counties: Flathead, Gallatin, Hill, Jefferson, Lewis and Clark, and Silver Bow. Remaining counties are classified as rural.

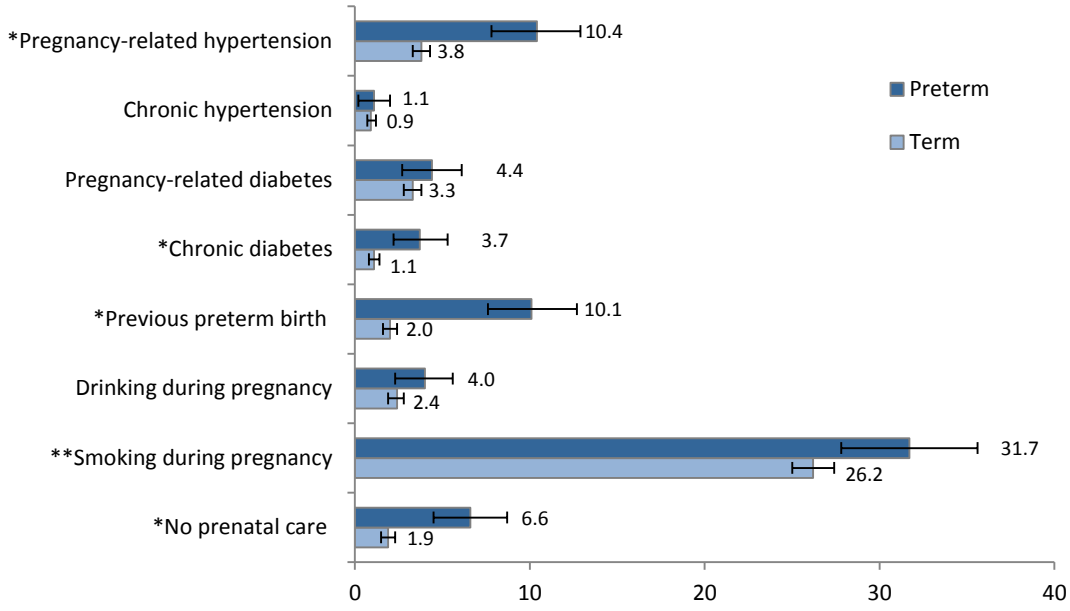
Table 1. Demographic and Behavioral Characteristics of Mothers of Preterm and Full-Term Singleton Live Births, American Indian/Alaskan Native Residents, Montana, 2008-2011

Characteristic		Preterm		Full-Term		
	Total N	n	%	n	%	X^2
	5,680	546	9.6	5,134	90.4	
Maternal Demographics						
Age group, years						0.005
≤19	1,190	78	14.3	1,112	21.7	
20-29	3,460	332	60.8	3,128	60.9	
≥30	1,030	136	24.9	894	17.4	
Marital status						Not Significant
Married	1,368	162	29.7	1,206	23.5	
Not Married	4,289	381	69.8	3,908	76.1	
Education						Not Significant
≤ High school	3,737	375	68.7	3,362	65.5	
> High school	1,886	163	29.9	1,723	33.6	
Payer						Not Significant
Medicaid	3,254	322	59.0	2,932	57.1	
Non-Medicaid	1,731	139	25.5	1,592	31.0	
Residential area						Not Significant
Metropolitan	1,161	110	20.1	1,051	20.5	
Micropolitan	741	61	11.2	680	13.2	
Rural	3,778	375	68.7	3,403	66.3	
Risk Factors						
Previous preterm birth						0.001
Yes	157	55	10.1	102	2.0	
No	5,478	482	88.3	4,996	97.3	
Prenatal care						0.001
Any prenatal care	5,242	451	82.6	4,791	93.3	
No prenatal care	134	36	6.6	98	1.9	
Drinking during pregnancy						Not Significant
Yes	147	22	4.0	125	2.4	
No	5,338	505	92.5	4,833	94.1	
Smoking during pregnancy						0.005
Yes	1,520	173	31.7	1,347	26.2	
No	3,984	355	65.0	3,629	70.0	
Chronic diabetes						0.005
Yes	75	20	3.7	55	1.1	
No	5,560	517	94.7	5,043	98.2	
Pregnancy-related diabetes						Not Significant
Yes	194	24	4.4	170	3.3	
No	5,441	513	94.0	4,928	96.0	
Chronic hypertension						Not Significant
Yes	51	6	1.1	45	0.9	
No	5,584	531	97.3	5,053	98.4	
Pregnancy-related hypertension						0.001
Yes	252	57	10.4	195	3.8	
No	5,383	480	87.9	4,903	95.5	

Risk Factors

Compared to women who had term deliveries, women who delivered prematurely had significantly higher prevalence of medical risk factors including pregnancy-related hypertension (pregnancy-induced hypertension and preeclampsia), chronic diabetes, and previous preterm births. Receiving no prenatal care or smoking during pregnancy was also significantly more common among women who had preterm births compared to women who did not experience preterm births [Figure].

Figure. Frequency of Selected Risk Factors, Preterm and Term Singleton Live Births, American Indian/Alaskan Native Residents, Montana, 2008-2011



Source: Montana Office of Vital Statistics.
*Statistically significant at p<0.001
**Statistically significant at p<0.005

Logistic Regression Model

To assess the independent effects of the socio-demographic and behavioral factors on preterm birth, we conducted a logistic regression analysis including the characteristics that were significant in the univariate analysis. The odds ratios from the logistic regression can be interpreted as the effect of each risk factor, controlling for the simultaneous contribution of the other factors in the model [Table 2]. The results of the logistic regression confirmed previously published research on risk factors associated with preterm birth:

- Older women were more likely to experience preterm birth than younger women.
- The odds of preterm delivery for those women who had no prenatal care were 44% higher than the odds for those women who received any prenatal care.
- Women who smoked during pregnancy had a 29% greater risk for having preterm birth than women who did not smoke during pregnancy.
- Previous preterm birth was the factor most strongly associated with a preterm birth in the index pregnancy.
- Women who had chronic diabetes or who developed hypertension during pregnancy were more likely to experience preterm birth than women who did not have these risk factors.

Table 2. Logistic Regression Model of Associated Risk Factors Among
Preterm Singleton Live Births to American Indian/Alaskan Native Residents, Montana, 2008-2011

Characteristic	Odds Ratio	95% Confidence Interval of Odds Ratio
Age		
≤19 years	**0.73**	**0.54, 0.98**
20-29 years	1.00	Reference
≥30 years	**1.35**	**1.05, 1.73**
Prenatal care		
Some prenatal care	1.00	Reference
No prenatal care	**4.44**	**2.80, 7.06**
Smoking during pregnancy		
No	1.00	Reference
Yes	**1.29**	**1.04, 1.61**
Previous preterm birth		
No	1.00	Reference
Yes	**5.10**	**3.51, 7.40**
Chronic diabetes[¶]		
No	1.00	Reference
Yes	**2.65**	**1.45, 4.81**
Pregnancy-related hypertension[≠]		
No	1.00	Reference
Yes	**3.33**	**2.37, 4.68**

Odds ratios in bold indicate significant statistical difference from the reference category.
[¶]Diabetes diagnosis prior to this pregnancy.
[≠]Pregnancy-related hypertension includes pregnancy induced hypertension (PIH), and preeclampsia.

Conclusions and Recommendations

Based on these findings, collaborative interventions aimed at modifiable risk factors such as preventing smoking or smoking cessation during pregnancy and timely initiation of prenatal care may help to reduce preterm births.[10] Timely enrollment into prenatal care allows for early detection of obstetric conditions such as pregnancy-related hypertension. Enhanced prenatal care with close monitoring of pregnancy may be especially beneficial for women with previous preterm births or chronic diabetes.[11]

This study focuses only on American Indian/Alaskan Native Montana residents who had preterm deliveries in the past four years (2008-2011). Subject matter experts agree that preterm delivery is a complex problem, and the ability to predict and prevent such births is limited.[12] To design effective interventions, further investigation is recommended on the early identification of all women at high risk for preterm birth. Overall, the interventions may yield modest decrease in the number of preventable preterm births but the health care cost savings would be substantial.

For more information about this report, contact
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[11] American Diabetes Association. http://www.diabetes.org/living-with-diabetes/complications/pregnant-women/before-pregnancy.html
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